

# INDIAN SCHOOL SOHAR UNIT TEST I (2022-23) PHYSICS THEORY (042)

No. of printed pages: 03 SET-A

CLASS: XII Max Marks: 20
DATE: 22/05/2022 Duration: 45 minutes

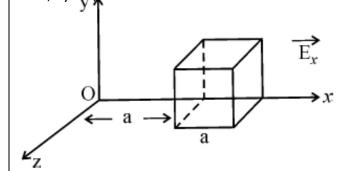
### **General Instructions:**

- (i) There are 13 questions in all. All questions are compulsory.
- (ii) This question paper has three sections: Section A, Section B, Section C and Section D.
- (iii) Section A contains 5 MCQ of **one mark** each, Section B contains two questions of **two marks** each, Section C contains two questions of **three marks** each Section D contains one case study-based question of five marks.

	of five marks.	
	SECTION A	
1	A charge Q is supplied to a metallic conductor. Which is true?  a) Electric field inside it is same as on the surface. b) Electric potential inside is zero.  c) Electric potential on the surface is zero d) Electric potential inside it is constant	1
2	A point charge +q, is placed at a distance d from an isolated conducting plane. The field at a point P on the other side of the plane is  a) directed perpendicular to the plane and away from the plane. b) directed perpendicular to the plane but towards the plane. c) directed radially away from the point charge. d) directed radially towards the point charge.	1
3	The electric flux through the surface:  (i)  (ii)  (iii)  (iv)  (i	1
	c) in Figure (ii) is same as Figure (iii) but is smaller than Figure (iv). d) is the same for all the figures.	
4	Figure shows electric field lines in which an electric dipole <i>p</i> is placed as shown. Which of the following statements is correct?	

	<del></del>	1		
	$-a \stackrel{P}{\longrightarrow} P$			
	<u>+q</u> →			
	-			
	a) The dipole will not experience any force. b) The dipole will experience a force towards right. c)The dipole will experience a force upwards.			
5	Work done to bring a unit positive charge un-accelerated from infinity to a point inside electric field is called:	1		
	a) Electric field b) Electric potential	-		
	c) Capacitance d) Electric flux			
SECTION B				
6	Figure shows two large plates P1 and P2 tightly held against each other and placed between two equal and			
	unlike point charges perpendicular o to the line joining them,			
	P <sub>1</sub> P <sub>2</sub>			
	Q +	2		
	a) What will happen to the plates when they are released?			
	b) Draw the pattern of the electric field lines for the system.			
7	a) Two equal balls having equal positive charge 'q' coulombs are suspended by two insulating strings of equal			
	length. What would be the effect on the force when a plastic sheet is inserted between the two?	2		
	b) Define electric dipole moment. Is it a scalar or vector?			
SECTION C				
8	$oldsymbol{A}$ parallel plate capacitor is charged by a battery and the battery remains connected, a dielectric slab is			
	inserted in the space between the plates. Explain what changes if any, occur in the values of the			
		3		
	a) Potential difference between the plates. b) electric field between the plates. c) capacitance			
	a) Charge on the plates d) energy stored in the capacitor.			

Define electric flux and write its SI unit. The electric field components in the figure shown are: Ex =  $\alpha x^{1/2}$ , Ey = 0, Ez = 0 where  $\alpha$  =100 NC<sup>-1</sup> m<sup>1/2</sup>. Calculate the charge within the cube, assuming a = 0.1m.

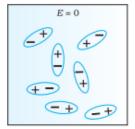


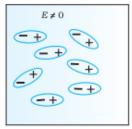
# SECTION D

### **CASE STUDY:**

# Read the following text and answer the following questions on the basis of the same:

Dielectric with polar molecules also develops a net dipole moment in an external field since the individual dipole moments tend to align with the field. When summed overall the molecules, there is then a net dipole moment in the direction of the external field, i.e., the dielectric is polarized. The extent of polarisation depends on the relative strength of two factors: the dipole potential energy in the external field tending to align the dipoles mutually opposite with the field and thermal energy tending to disrupt the alignment. Thus in either case, whether polar or non-polar, a dielectric develops a net dipole moment in the presence of an external field. The dipole moment per unit volume is called polarisation.





(b) Polar molecules

- 10 Define Polarisation. 1
- Polarisation causes the electric field in the dielectrics decreases: True/False?

1

2

- 12 Electric field inside the capacitor is 50 V/m and the dielectric constant = 4.5. What is polarisation?
- In the circuit shown, initially  $K_1$  is closed and  $K_2$  is open. What are the charges on each capacitor? Then  $K_1$  was opened and  $K_2$  was closed (order is important), what will be the charge on each capacitor now?  $[C = 1\mu F]$

